**WHAT IS CLAIMED IS:**

1. A device for compensating for PMD (polarization mode dispersion) that occurs in a transmission optical fiber in an optical transmission system, comprising:

a polarization controller (PC) for converting the state and direction of polarization of a signal beam received through the transmission optical fiber;

a polarization beam splitter for splitting the signal beam outputted from the PC into two mutually orthogonal polarization components, to transmit a first polarization component among the two components to a first path and send a second polarization component to a second path, and then combining the two polarization components with each other after they have been reflected from the ends of the first and second paths to transmit the combined beam to an output path;

a variable delay line for variably applying a time delay to the first polarization component traveling over the first path;

a Faraday rotation mirror for rotating a polarization component outputted from the variable delay line of the first path by a predetermined angle to reflect it;

a PSP monitoring part for rotating a portion of the second polarization component traveling over the second path by a predetermined angle to reflect it and receiving the remaining portion thereof to output it as an electric signal;

a PC controller for controlling the PC such that two orthogonal PSP components of the signal beam are aligned with two orthogonal axes of the polarization beam splitter using the signal outputted from the PSP monitoring

part;

an optical tap for branching the signal beam that is outputted from the polarization beam splitter to travel to the output path; and

a delay line controller for controlling the variable delay line using the signal beam branched by the optical tap, to remove differential time delay between the first and second polarization components of the signal beam.

2. The device as claimed in claim 1, wherein the Faraday rotation mirror located on the first path includes a Faraday rotator and a mirror.

3. The device as claimed in claim 1, wherein the PSP monitoring part comprises:

a partial transmission Faraday rotation mirror that includes a Faraday rotator and a partial transmission mirror, to rotate a portion of the second polarization component by a predetermined angle to reflect it and transmit the remaining portion thereof;

a photo-detector for converting the beam transmitted through the partial transmission Faraday rotation mirror into an electric signal; and

a band pass filter for filtering a specific frequency component of the electric signal.

4. The device as claimed in claim 1, wherein the PSP monitoring part comprises:

an optical tap;

a Faraday rotation mirror for rotating the second polarization component that has passed through the optical tap by a predetermined angle to reflect it;

a photo-detector for converting a beam branched out by the optical tap into an electric signal; and

a band pass filter for filtering a specific frequency component of the electric signal.

5. The device as claimed in claim 1, wherein the PC controller comprises:

a power comparator for comparing a first power value of the signal outputted from the PSP monitoring part with a second power value that has been previously measured; and

a feedback control signal applying part for applying a feedback control signal to the PC to select the smaller value among the first and second power values according to comparison results by the power comparator.

6. The device as claimed in claim 1, wherein the delay line controller comprises:

a photo-detector for converting the beam branched out by the optical tap into an electric signal;

a band pass filter for filtering a specific power spectrum component of the electric signal;

a power comparator for comparing a first power value of the signal filtered by the band pass filter with a second power value that has been

previously measured; and

a feedback control signal applying part for applying a feedback control signal to the variable delay line to select the larger value among the first and second power values.

7. The device as claimed in claim 1, wherein the delay line controller comprises:

a DOP (Degree of Polarization) measurement unit for measuring DOP of the signal beam branched out by the optical tap;

a DOP comparator for comparing the measured first DOP with a second DOP that has been previously measured; and

a feedback control signal applying part for applying a feedback control signal to the variable delay line to select the larger value among the first DOP and the second DOP.

8. The device as claimed in claim 1, wherein the PC controller is operated independently of the delay line controller.

9. A method for compensating for PMD that occurs in a transmission optical fiber in an optical transmission system, comprising:

(a) a PC converting the state and direction of polarization of a signal beam received through the transmission optical fiber;

(b) a polarization beam splitter splitting the signal beam outputted from the PC into two mutually orthogonal polarization components, to transmit a first polarization component among the two components to a first

path and transmit a second polarization component to a second path, and combining the two polarization components with each other after they have been reflected from the ends of the first and second paths to transmit the combined beam to an output path;

(c) variably applying a time delay to the first polarization component traveling over the first path using a variable delay line;

(d) rotating a polarization component outputted from the variable delay line of the first path by a predetermined angle to reflect it through a Faraday rotation mirror;

(e) a PSP monitoring part rotating a portion of the second polarization component traveling over the second path by a predetermined angle to reflect it and transmitting the remaining portion thereof;

(f) converting the beam transmitted through the PSP monitoring part into an electric signal and controlling the PC with a PC controller such that two orthogonal PSP components of the signal beam are aligned with two orthogonal axes of the polarization beam splitter using the electric signal;

(g) branching the signal beam that is outputted from the polarization beam splitter to travel to the output path using an optical tap; and

(h) removing differential time delay between the first and second polarization components of the signal beam using the signal beam branched by the optical tap.

10. The method as claimed in claim 9, wherein (e) comprises:

rotating a portion of the second polarization component traveling over the second path by a predetermined angle to reflect it and transmitting the

remaining portion thereof;

converting the transmitted component into an electric signal; and

filtering a specific frequency component of the power spectrum of the electric signal.

11. The method as claimed in claim 9, wherein (e) comprises:

branching and passing the second polarization component traveling over the second path using an optical tap;

rotating the polarization component that has passed through the optical tap by a predetermined angle to reflect it;

converting the beam component branched by the optical tap into an electric signal; and

filtering a specific frequency component of the power spectrum of the electric signal.

12. The method as claimed in claim 9, wherein (f) comprises:

comparing a first power value of the signal outputted from the PSP monitoring part with a second power value that has been previously measured; and

applying a feedback control signal to the PC to select the smaller value among the first and second power values, to align the first and second polarization components of the signal beam with two orthogonal axes of the polarization beam splitter.

13. The method as claimed in claim 9, wherein (h) comprises:

converting the beam branched out by the optical tap into an electric signal;

filtering a specific power spectrum component of the power spectrum of the electric signal;

comparing a first power value of the filtered signal with a second power value that has been previously measured; and

applying a feedback control signal to the variable delay line to select the larger value among the first and second power values, to remove differential time delay between the first and second polarization components.

14. The method as claimed in claim 9, wherein (h) comprises:

measuring DOP of the signal beam outputted from the optical tap;

comparing the measured first DOP with a second DOP that has been previously measured; and

applying a feedback control signal to the variable delay line to select the larger value among the first DOP and the second DOP, to remove differential time delay between the first and second polarization components.

15. The method as claimed in claim 9, wherein (f) and (h) are carried out independently of each other.